

Letter from Epping et al. to the European Patent Office in Munich



Our Reference: P2003,0415 EP 01

Munich, 5th December 2003

EP Patent No. **EP 1 140 626 B1**
Title: **IR DIODE BASED HIGH INTENSITY LIGHT**
Proprietor: **Allied Signal Inc.**
 Morristown, New Jersey 07962-2245 (US)

Opponent: **Osram Opto Semiconductors GmbH**
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 GERMANY

In the name of and on behalf of Osram Opto Semiconductors GmbH,

opposition

is filed against the patent indicated above according to Article 99 EPC. The opposition fee of 610.00 € should be debited from the current account according to the enclosed debit order. It is requested that patent EP1 140 626 B1 (designated below as contested patent) be fully revoked. It is requested that a possible response of the proprietor be delivered before making a decision.

The opposition is based on the opposition grounds according to Article 100 a) EPC, Article 100 b) EPC and Article 100 c) EPC.

In the event that the above-mentioned request cannot be granted fully in the written process, alternatively

oral proceedings

are requested.

Grounds

The following documents are used to justify the opposition:

- D1: DE 197 06279 A1
- D2: JP 6213967 (including English abstract JP 621967 A)
- D3: US 3 805 347
- D4: E. Hecht, "Optik", Addison-Wesley 1989, page 136-140
- D5: US 3 860 847
- D6: DE 196 49 650 A1
- D7: DE 3 719 338 A1
- D8: US 5 685 637
- D9: US 4 547 701
- D10: US 4 803 689
- D11: Sze, Physics of Semiconductor Devices, 2nd Edition, John Wiley & Sons, 1981, Chapter 12 (page 681-742)

1. Claim 1

1.1. Novelty

D1: Document D1 describes a light arrangement 1 which contains a heat-conducting housing 5, 19 (see column 1, line 66-68 and column 2, line 1-2), wherein the housing defines a cavity (see figure).

Furthermore, the light arrangement contains a semiconductor laser chip 2, wherein from the detail of the semiconductor material $\text{Al}_x\text{Ga}_{1-x}\text{As}$ (see column 2, line 6) it follows that the semiconductor laser chip 2 is one in the infrared diode, since semiconductor lasers with the said material usually emit in the infrared spectral range.

Furthermore, an aspherical lens 3 (see column 2, line 28-29) is provided. It is clear

to the expert that he may align the housing in any manner, since both the semiconductor chip and the aspherical lens are firmly connected to the housing (see column 2, 7-9 and column 1, 30-31). In the case of an emission direction upwards, the aspherical lens 3 is connected to the upper section of the housing, which is shown by the upper (in the figure right-hand) section of the base support part 5. It may be noted here that in claim 1 of the contested patent, only an upper and a lower section of the housing is mentioned without further concretisation and without a detail to which "upper" or "lower" relates.

The aspherical lens 3 serves for beam guiding or beam imaging of the laser radiation (see column 1, line 22-23 and column 3, line 3-4). Indeed, it is indicated in the German translation of the patent claims that "the lens is designed to direct infrared light in parallel manner". More accurately, the definitive English draft of patent claim 1 may be formulated, according to which the infrared light is "collimated" (... "adapted to collimate infrared light", see column 7, line 1-2). Collimation represents, according to the description, the realisation of a narrow light beam, optionally with a preset divergence (see column 5, paragraph 20), so that in any case exact parallelisation cannot be meant by this. Collimation in the sense of exact parallelisation would also contradict the object of patent claim 2, since such exact parallelisation excludes the arrangement of the infrared diode outside the lens focal point. Collimation to realise a narrow light beam is likewise achieved in D1 using the aspherical lens.

The infrared light is radiated through a cavity, which forms the housing 5, 19, to the aspherical lens 3 (see figure).

Furthermore, the light arrangement contains a heat-conducting base in the form of the intermediate support part 8, which is arranged on the base support part 5 on the lower housing section. The infrared diode 2 is connected to the heat-conducting base 8 (see column 1, line 66-68). Reference is made in particular in column 1, line 52-60 to the good thermal conductivity of the material, from which the intermediate support part 8 is made.

The light arrangement described in publication D1 therefore has all features of patent claim 1. The object of claim 1 is therefore not novel with respect to D1.

D2: Publication 2 describes a light arrangement with a heat-conducting housing, having a housing part 15, wherein this housing part has an upper section 15-1 and a lower section 15-2 and defines a cavity (see Figure 1), which is enclosed on the one hand by the housing part 15 and on the other hand by the base 12.

Furthermore, the light arrangement contains an LED 11. LEDs are divided into two groups, namely visible LEDs and infrared LEDs. For the expert who knows this categorisation (as proof reference is made to D11, chapter 12.3.1 and chapter 12.3.2 show this exactly), it can be seen directly and unambiguously from D2 that it is either a visible or infrared LED, wherein he has no reason to consider only visible LEDs. Hence, infrared diodes are also obviously included from the content of D2 for the expert.

A lens is connected to the upper section of the housing 15 (see Figure 1). This lens has an elliptical outer surface 15-2 (see abstract). Accordingly, it is an aspherical lens. The infrared light is radiated through a cavity, which forms the housing, to the aspherical lens (see Figure 1). The aspherical lens is designed so that it directs the infrared light in parallel manner or collimates it (see abstract, last sentence).

Furthermore, the light arrangement contains a base 12, which is arranged on the lower section of the housing 15 (see Figure 1), wherein the LED 11 is connected to the base 12 (see Figure 1). Since the base 12 is undoubtedly produced from a solid material, it also has a certain thermal conductivity, so that the base is heat-conducting. Since concrete details on this thermal conductivity are not present in claim 1 of the contested patent, any type of thermal conductivity is encompassed by it. The same applies to the thermal conductivity of the housing.

The light arrangement described in publication D2 therefore has all features of patent claim 1. The object of claim 1 is therefore not novel with respect to D2.

1.2 Inventive activity

D3: Document D3 describes a light arrangement (see column 1, 57-58) which includes (see Figure 2):

- a heat-conducting housing 18 (see column 2, line 33), wherein the housing has an upper section and a lower section and defines a cavity (see Figure 2),
- an infrared diode 11 (see column 1, line 10-15)
- a lens 21, which is connected to the upper section of the housing (see column 2, line 36-37), wherein the infrared light is radiated through a cavity to the lens 21 (see Figure 2), and the lens is designed to collimate the infrared light (see column 2, line 65-66)
- a heat-conducting base 12 which is arranged on the lower housing section, wherein the infrared diode 11 is connected to the heat-conducting base 12 (see column 2, line 24-26).

The light arrangement according to patent claim 1 therefore differs only by the feature of D3, that the lens is designed to be aspherical.

However, the use of aspherical lenses is widespread and corresponds to general specialist knowledge. As proof of this, reference is made to publication D4, which is a generally known textbook of optics. In the 2nd paragraph of the right-hand column of page 139, it says:

“ Today one finds aspherical elements which are produced from plastic or glass distributed in all instruments over the entire quality range, including in telescopes, projectors, cameras and apparatuses for clarification purposes”. According to the description, the claimed light arrangement is intended for a night-vision apparatus, that is an apparatus for clarification purposes. The use of an aspherical lens is obvious for the expert, who wishes to improve, for example the imaging properties of the device shown in D3, that is not only generally, but particularly also for such an apparatus due to his general specialist knowledge.

The object of patent claim 1 is therefore not based on an inventive activity.

D5: Document D5 describes a light arrangement (see column 1, line 6), which includes (see Figure 3):

- a heat-conducting housing 10, 12, 14 (see abstract, line 6 and column 4, line 1-6), wherein the housing has an upper section and a lower section and defines a cavity 16 (see Figure 3),
- an infrared diode C (see column 3, line 23-25)
- a lens 21, which is connected to the upper section of the housing (see column 2, line 38-40), wherein the infrared light is radiated through a cavity 16 to the lens 12 (see Figure 3). It can be seen easily that the lens serves to collimate the emitted radiation.
- a heat-conducting base D which is arranged on the lower housing section, wherein the infrared diode C is connected to the heat-conducting base D (see column 3, line 5-9).

The light arrangement according to patent claim 1 therefore differs only by the feature of D5 that the lens is designed to be aspherical.

For the same reasons as previously stated in connection with D3, it is obvious for the expert due to general specialist knowledge to use an aspherical lens for the lens provided. The object of patent claim 1 is therefore also not based on an inventive activity.

D3 + D6 or D5 + D6:

As has been established previously, the light arrangement according to patent claim 1 differs in each case only by the feature of one of the publications D3 or D5 that the lens is designed to be aspherical.

Publication D6 describes a radiation-emitting semiconductor component, in which an infrared diode 2 (see column 4, line 21-22) is provided with an aspherical lens cap 23 (see column 4, line 41-44) in order to achieve a high radiation intensity and a low half angle for the emitted radiation (see column 1, 60-63).

The expert who is entrusted with the task of developing a light arrangement with

an infrared diode, which produces a concentrated beam with high intensity, knows from D6 to provide the infrared diode with an aspherical lens for this purpose. Hence, the expert reaches the object of patent claim 1 by a combination of one of the publications D3 or D5 with the publication D6, without thus being inventively active.

D3 + D7 or D5 + D7:

As has been previously established, the light arrangement according to patent claim 1 differs in each case only by the feature of one of publications D3 or D5 that the lens is designed to be aspherical.

Publication D7 describes a light diode display device, in which a light-emitting diode 23 (see column 4, line 21-22) is provided with a lens cap 26 (see column 3, line 41-44), which may have a parabolic shape (see column 2, line 44-47).

Furthermore, the aspherical shape of the lens cap can also be seen from Figure 6. "The total quantity of perceptible light produced by the LED unit is increased" by the arrangement described in D7.

The expert who is entrusted with the task of developing a light arrangement with an infrared diode according to D3 or D5, in which the total quantity of perceptible light is increased, knows from D7 to place an aspherical lens behind an infrared diode for this purpose. Hence, the expert reaches the object of patent claim 1 by a combination of one of the publications D3 or D5 with publication D7, without thus being inventively active.

2. Claim 2:

2.1 Novelty

D1: As has been shown under 1.1, the light arrangement described in publication D1 has all features of patent claim 1. It can be seen clearly from the figure and sub-claim 3 of D1 (see column 3, line 22-26) that focussing of the laser radiation may be achieved by the cylindrical lens 3. The lens described in D1 must therefore have a focal point and the infrared diode must be offset slightly from the focal point of

the lens. Hence, the object of claim 2 is not novel with respect to D1.

2.2. Inventive activity

D2: As has been shown under 1.1, the light arrangement described in publication D2 has all features of patent claim 1.

The aspherical lens described in D2 is designed to be convex on both sides, so that it is obvious that this lens has a focal point. For an expert in the field of optics and optoelectronics who is confronted with the task of adjusting a required beam divergence, it is obvious to vary the distance between the lens and the radiation source. Accordingly, he will offset the lens slightly from the focal point, when he would like to achieve a low beam divergence. Starting from D2, the expert therefore reaches in obvious manner the object of claim 2, without thus being inventively active.

3. Claim 3

Inventive activity

D3 + D6 or D3 + D7:

As has been shown under 1.2, the object of patent claim 1 can be seen in obvious manner from in each case a combination of publications D3 + D6, or D3 + D7.

The lens 21 described in D3 has an essentially flat inner surface and a convex outer surface (see Figure 2). Hence, the object of patent claim 3 can also be seen in obvious manner from in each case a combination of publications D3 + D6, or D3 + D7. The object of claim 3 is therefore not based on an inventive activity.

D5 + D6 or D5 + D7:

As has been shown under 1.2, the object of patent claim 1 can be seen in obvious manner from in each case a combination of publications D5 + D6, or D5 + D7.

The lens 12 described in D5 has an essentially flat inner surface and a convex outer

surface (see Figure 3). Hence, the object of patent claim 3 can also be seen in obvious manner from in each case a combination of publications D5 + D6, or D5 + D7. The object of claim 3 is therefore not based on an inventive activity.

4. Claim 4

Practicability

Claim 4 contains the detail, the NVIS radiation intensity is more than 2. It cannot be seen either from the claim or from the description, what is to be understood by "NVIS intensity". The expert thus has no details whatever of how the feature of the indicated "NVIS intensity" is to be realised. The invention, in so far as it relates to the object of patent claim 4, is thus not so clearly and completely disclosed that the expert may execute it.

5. Claim 5

5.1 Novelty

D1: As has been shown under 1.1, the light arrangement described in publication D1 has all features of patent claim 1. The light arrangement described in D1 contains a heat-conducting base in the form of an intermediate support part 8, which is arranged on the base support part 5 on the lower housing section. The infrared diode 2 is connected to the heat-conducting base 8 (see column 1, line 66-68). Furthermore, the base support part consists, for example of copper, and serves as a heat sink (see column 1, line 47-48). Reference is made in particular in column 1, line 52-60 to the good thermal conductivity of the intermediate support part 8.

As is known, a heat sink serves to remove the heat loss being produced. Hence, an excessive temperature rise for the component mounted on the heat sink is prevented with respect to operation without a heat sink or a preset operating

temperature is maintained. As is known, displacement of the emission wavelength should be prevented with a heat sink, as shown in D1, particularly for lasers. Hence, the object of claim 5 is not novel with respect to D1.

5.2 Inventive activity

D2 and D8:

As has been shown under 1.1, the light arrangement described in publication D2 has all features of patent claim 1. Publication D8 describes a light arrangement with an infrared diode, wherein the infrared diode is designed so that it does not overheat during operation (see column 2, line 20-23). It is thus obvious to the expert from a combination of publications D2 and D8 to design the light arrangement so that a preset operating temperature is maintained. The object of claim 5 is therefore not based on an inventive activity.

6. Claim 6

Inventive activity

D2 and D8: As has been shown under 5.2, the object of claim 5 can be seen in obvious manner from a combination of publications D2 and D8. Since D8 describes an infrared diode, which has a peak emission at 880 nm (see abstract), the additional feature of patent claim 6 can also be seen in obvious manner from a combination of publications D2 and D8. The object of claim 6 is therefore not based on an inventive activity.

7. Claim 7

Inventive activity

D1 or D2 or D3+D6 or D3+D7 or D5+D6 or D5+D7:

As has been shown under 1.1, the light arrangements described in publication D1 or publication D2 have all features of patent claim 1. As has been shown under 1.2, the object of patent claim 1 can be seen in obvious manner from in each case a combination of publications D3+D6 or D3+D7 or D5+D6 or D5+D7.

To design the light arrangement so that the power requirement of the light arrangement is about 10 W to 20 W, is only an obvious selection from the range of possibilities. Furthermore, such a power requirement is conventional for infrared diodes, such as for example laser diodes. The selection mentioned in claim 7 shows neither advantageous effects nor unexpected properties of the claim object with respect to the state of the art, so that inventive activity cannot be based on the said selection.

8. Claim 8

Inventive activity

D1+D8 or D2+D8 or D3+D6+D8 or D3+D7+D8 or D5+D6+D8 or D5+D7+D8:

As has been shown under 1.1, the light arrangements described in publication D1 or publication D2 have all features of patent claim 1. As has been shown under 1.2, the object of patent claim 1 can be seen in obvious manner from in each case a combination of publications D3+D6 or D3+D7 or D5+D6 or D5+D7.

It is the object of claim 8 to use a light arrangement according to patent claim 1 in a lamp head. A light arrangement with an infrared diode in a lamp head 100 (see column 1, 11-27) is described in D8. The use of the light-emitting arrangement with an infrared diode in conjunction with a night-vision apparatus is provided in particular in D8 (see column 5, line 22-23). The expert therefore reaches the object of claim 8 without being inventively active from the said combinations of publications. Rather, the addition of the lamp head to the object of patent claim 1 is a pure aggregation, which has no novel or inventive overall effect whatever, since only known elements are combined. The object of claim 8 is therefore not based on an inventive activity.

D1+D9 or D2+D9 or D3+D6+D9 or D3+D7+D9 or D5+D6+D9 or D5+D7+D9:

Furthermore, a light-emitting arrangement with an infrared diode in a lamp head 10 (see column 2, line 24-26 and Figure 1) is also described in D9. In particular the use of a light arrangement with an infrared diode in conjunction with a night-vision

apparatus is provided in D9 and in the contested patent (see column 1, 6-11) and hence is obvious. In this context, reference is made to the similarity of Figure 1 of D9 and Figure 8 of the contested patent, from which it can be seen that the use of the light arrangement is provided in a very similar lamp head. The expert therefore reaches the object of claim 8 without being inventively active by one of the combinations of the said publications. The object of claim 8 is therefore not based on an inventive activity.

9. Claim 9

Inventive activity

D1+D10 or D2+D10: As has been shown under 1.1, the light arrangements described in publication D1 or publication D2 have all features of patent claim 1. D10 describes an infrared diode 11 (see column 4, line 21-22), which is connected to a thermoelectric cooler 2 (see column 2, line 25-33 and Figure 1), in order to avoid fluctuation of the initial power or of the wavelength of the emitted radiation by maintaining an intended operating temperature (see column 2, line 15-22). The object of patent claim 9 can therefore be seen from a combination of D10 with one of the publications D1 or D2 in obvious manner. The object of claim 9 is therefore not based on an inventive activity.

10. Claim 10

Inventive activity

D1+D10 or D2+D10: As has been shown under 9., the object of claim 9 can be seen in obvious manner from a combination of publications D1+D10 or D2+D10. The thermoelectric cooler 2 described in D10 is arranged between a heat-conducting base 1 and the infrared diode 11 (see Figure 1 and column 2, line 37-40). The function of the outer housing 1 as a heat-conducting base is also emphasised in column 4, line 59-63. Hence, the additional feature of claim 10 is also described in D10, so that the object of patent claim 10 can be seen in obvious

manner from a combination of publications D1+D10 or D2+D10. The object of claim 10 is therefore not based on an inventive activity.

11. Inadmissible extension

In the originally filed documents, that is the PCT application PCT/US99/30342, a thermoelectric cooler is mentioned in independent claim 11 and in claim 12.

A reference back to claims 1 to 10 is not mentioned. Furthermore, a thermoelectric cooler is described within the framework of the exemplary embodiments according to Figure 1 and 2, wherein the exemplary embodiment for Figure 1 has all features of claims 1 to 9 and the exemplary embodiment for Figure 2 has essentially the features of claim 1. The further exemplary embodiments deal with details and supplements of the afore-mentioned exemplary embodiments.

According to claim 9 of the contested patent, the combination of a thermoelectric cooler with the features mentioned in claim 9 is claimed with each individual one of claims 1 to 8. A combination of claim 9 with one of claims 2 to 8 alone cannot however be seen from the originally filed documents. Hence, a light arrangement, which has the features of claims 1 and 2 of the contested patent alone, that is without the remaining features of the exemplary embodiment for Figure 1, is not disclosed, for example in the originally filed documents. Also, the remaining description and the originally filed claims do not contain such a disclosure. The same applies to the features of claims 3 to 8 of the contested patent.

Hence, the object of the contested patent goes beyond the content of the originally filed draft.

For the above-mentioned reasons, the request to fully revoke the patent is justified.

EPPING HERMANN FISCHER

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Enclosures

Publications D1 – D11

Debit order

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